Roll No. | | | | | | | | | | | | | Total No. of Pages : 02

Total No. of Questions : 18

B.Tech. (ME) (2018 Batch) (Sem.–3)

THEORY OF MACHINES – I

Subject Code : BTME-302-18

M.Code : 76418

Time : 3 Hrs. Max. Marks : 60

INSTRUCTIONS TO CANDIDATES :

1. **SECTION-A is COMPULSORY consisting of TEN questions carrying TWO marks each.**
2. **SECTION-B contains FIVE questions carrying FIVE marks each and students have to attempt any FOUR questions.**
3. **SECTION-C contains THREE questions carrying TEN marks each and students have to attempt any TWO questions.**

SECTION-A

Write briefly :

1. What is Kinematic Chain?
2. Explain the terms : (a) Lower pair (b) Higher pair.
3. Define Creep of Belt.
4. What is Radial Cam?
5. Define (a) Base circle (b) Pitch circle.
6. Differentiate brake and dynamometer.
7. State any two advantages of V-belt drive over flat belt drive.
8. What is Hunting of Governors?
9. Draw turning moment diagram for a four stroke cycle internal combustion engine.
10. How governor is differ from flywheel?

SECTION-B

11. Two pulleys, one 450 mm diameter and the other 200 mm diameter are on parallel shafts 1.95 m apart and are connected by a crossed belt. Find the length of the belt required and the angle of contact between the belt and each pulley. What power can be transmitted by the belt when the larger pulley rotates at 200 rev/min, if the maximum permissible tension in the belt is 1 kN, and the coefficient of friction is 0.25?
12. What is the condition for correct steering? Discuss Ackerman steering mechanism.

13. A cam is to be designed for a knife edge follower with the following data :

    a) Cam lift = 40 mm during 90° of cam rotation with simple harmonic motion.

    b) Dwell for the next 30°.

    c) During the next 60° of cam rotation, the follower returns to its original position with simple harmonic motion.

    d) Dwell during the remaining 180°.

    Draw the profile of the cam when the line of stroke of the follower passes through the axis of the cam shaft. Take radius of base circle of the cam = 30 mm. Also determine the maximum velocity of the follower during its ascent and descent, if the cam rotates at 240 r.p.m.

14. Explain the principle and working of Prony brake dynamometer.

15. The turning moment diagram for a multicylinder engine has been drawn to a scale 1mm = 600 N-m vertically and 1mm = 3° horizontally. The intercepted areas between the output torque curve and the mean resistance line, taken in order from one end, are as follows : + 52, –124, + 92, –140, + 85, –72 and + 107 mm^2, when the engine is running at a speed of 600 r.p.m. If the total fluctuation of speed is not to exceed ± 1.5 % of the mean, find the necessary mass of the flywheel of radius 0.5 m.

SECTION-C

16. The arms of a Porter governor are each 250 mm long and pivoted on the governor axis. The mass of each ball is 5 kg and the mass of the central sleeve is 30 kg. The radius of rotation of the balls is 150 mm when the sleeve begins to rise and reaches a value of 200 mm for maximum speed. Determine the speed range of the governor. If the friction at the sleeve is equivalent of 20 N of load at the sleeve, determine how the speed range is modified.

17. a) What do you mean by inversion of the mechanism? Explain any one inversion of four bar chain.

    b) A pulley is driven by a flat belt, the angle of lap being 120°. The belt is 100 mm wide by 6 mm thick and density 1000 kg/m^3. If the coefficient of friction is 0.3 and the maximum stress in the belt is not to exceed 2 MPa, find the greatest power which the belt can transmit and the corresponding speed of the belt.

18. Write short notes on the following (**any two**) :

    a) Universal joint.

    b) Whitworth quick return mechanism.

    c) Sensitiveness of governors.

NOTE : Disclosure of Identity by writing Mobile No. or Making of passing request on any page of Answer Sheet will lead to UMC against the Student.